

Introduction
to Operations Research
for Managers

Dear Sir:

You have probably heard about Operations Research -- scientific management problem-solving methods. If that is as far as you've gone, and you want to find out more about the subject, enough to see where operations research can work for you, the "Introduction to Operations Research for Managers" seminar is what you've waited for.

This is an intensive, three-day seminar designed for management people with no background in Operations Research or in data processing. It concentrates on a primary Operations Research technique, linear programming, and follows the case study method to illustrate specific areas of application. These include:

- Inventory control
- Portfolio selection
- Product mix
- Advertising media selection
- Truck payloads
- Production planning
- Capital budgeting
- Material flow

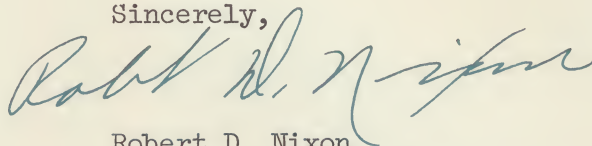
The seminar is taught by Milton Godfrey, a C-E-I-R consultant who is not only experienced in the application of Operations Research techniques in many different applications, but who is particularly skilled in making a technical subject understood by non-technical management people.

To benefit from this course you must have two things. One is familiarity with algebra at the high school level. The other is the ability to see how linear programming can benefit your organization. That is the intent of this seminar -- to help you produce the kind of creative idea that has resulted in profitable use of Operations Research in applications ranging from advertising to oil refining.

-- OVER --

Attendance at this seminar, May 23-24-25 at the new International Inn in Washington, D.C., will be limited to twenty-five students. To register, mail the enclosed business reply card today.

Sincerely,

A handwritten signature in blue ink, appearing to read "Robert D. Nixon", written in a cursive style.

Robert D. Nixon
Director of Curriculum

P.S. Should someone else in your organization know of this seminar?

INTRODUCTIONS TO OPERATIONS RESEARCH FOR MANAGERS

A three-day seminar

A non-technical introduction to a basic operations research technique, designed for managers who need to learn enough about operations research to understand its potential and see possible areas of application. No operations research or data processing background is required, but the student should have a good grasp of high school algebra. The operations research technique covered is linear programming, and the case study method is followed to illustrate its use in solving complex problems in inventory control, portfolio selection, product mix, advertising media selection, truck payloads, production planning, capital budgeting, and material flow. Tuition, including lunches and course materials, is \$195 for the first student and \$175 for others from the same organization.

International Inn
Washington, D. C.
May 23, 24, 25

Register me for: INTRODUCTION TO OPERATIONS RESEARCH ☐

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C-E-I-R, Inc,**

**1200 Jefferson Davis Highway
Arlington, Virginia**

1

THE INSTRUCTOR

Milton L. Godfrey is a C-E-I-R, INC., senior operations research analyst with broad experience in the practical uses of scientific techniques in industry. In his current assignment at the C-E-I-R Research and Computing Center in New York, Godfrey is responsible for a wide variety of operations research projects, mathematical analyses, information systems, and econometric studies. Before he joined C-E-I-R's professional staff he served in various management capacities with Talon, Inc., and Chase Aircraft, and as a consultant for leading organizations. He is a registered professional engineer and author of several papers on applications of linear programming.



REGISTRATION: Tuition, including all course materials and luncheons, is \$195 for the first student and \$175 for others from the same organization. A maximum of twenty-five registrations will be accepted. Classes begin at 9 a.m. and end at 5 p.m. Hotel rooms are not included.

HOTEL ACCOMMODATIONS: The seminar will be presented at the new International Inn, 14th and M Streets, N.W., Washington, D. C. A block of single rooms for seminar participants at \$14 per day will be held until two weeks prior to the seminar. The Inn's phone number is: (202) 783-4600.

OTHER COURSES: Among other seminars in the C-E-I-R seminar program is:

SURVEY OF DATA COMMUNICATIONS

For data processing personnel preparing for "on line" or "real time" systems involving data communications. Covers hardware and software considerations important to successful system design, and data communications concepts and terminology. Mayflower Hotel, Washington, D. C., June 21-22-23.

For an outline of this seminar or others scheduled in coming months, write:

Registrar

Institute for Advanced Technology

C-E-I-R^{INC}

1200 Jefferson Davis Highway
Arlington, Virginia 22202

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Area Code 703 — 884-6377

INTRODUCTION TO OPERATIONS RESEARCH FOR MANAGERS

THE CONCEPT OF LINEAR PROGRAMMING

- What is an allocation problem?
- Brief history of developments.
- Mathematical methods available for solution.
- Position of linear programming among alternative methods.

SIMILARITY BETWEEN MATHEMATICAL STATEMENTS IN LINEAR PROGRAMMING AND ENGLISH STATEMENTS ABOUT THE PROBLEM. REVIEW OF THE FREQUENTLY USED TYPES OF EQUATIONS (STATEMENTS).

A SIMPLE EXAMPLE OF A LINEAR PROGRAM

- Relation between resources and activities.
- Use of slack variables.
- Results of computation; types of output available.
- Effect of errors in data.

USE OF COMPUTERS. PROBLEM SIZE LIMITATIONS. COMPUTER TIME REQUIREMENTS.

A PROBLEM ABOUT TRANSPORTATION

- Structure: How to go from real problem to computer input.
- Output: How to interpret.
- How to prepare against contingencies, or what to do when the optimal solution calls for the use of resources that are suddenly unavailable.

A SIMPLE PROBLEM ABOUT MARKET DEMAND AND MANUFACTURING CAPACITY

- Structure of input.
- Understanding the output.

A CAPITAL INVESTMENT PROBLEM RELATED TO MANUFACTURING FACILITIES

- Structure of input.
- Understanding the output.

SELECTING TRUCKS; A CAPITAL INVESTMENT PROBLEM

- Structure of input.
- Relation between units used in resource limitations and units used to describe activities.
- Understanding the output.

THE MIX PROBLEM

- Typical structure.
- General applications.
- Understanding the output.

A SCALED-DOWN VERSION OF AN ACTUAL MODEL—MATERIALS FLOW THROUGH A MULTI-PLANT OPERATION: A CASE HISTORY

- The problem.
- The structure of the linear program.
- The output.

HOW TO GET THE PROBLEM INTO THE COMPUTER

PRODUCTION PLANNING FOR MULTIPLE PROCESS LINES: A CASE HISTORY

- The problem.
- Structure of the linear program.
- The output.

INTEGER PROGRAMMING: CURRENT DEVELOPMENTS AND CAPABILITIES

HOW TO HANDLE ITEMS SUCH AS DISCOUNTS, PENALTIES, OVERTIME, ETC. THE GENERAL PROBLEM OF NON-LINEARITY

- Approximation by piecewise linear relationships.
- The method of separable variables.
- Application problems: examples from previous case histories.

QUADRATIC PROGRAMMING

- How does it work?
- Where does it apply?

MEDIA SELECTION: AN ADVERTISING PROBLEM

- The problem described.
- Structure of the linear program.
- The output.

PORTFOLIO SELECTION

- The problem and its history.
- Structure of the linear program.
- The output.

A BRIEF LOOK AT VERY LARGE-SCALE PROBLEMS

- A regional economic problem.
- Decomposition: A method for solving very large problems.
- Requirements of computation and associated model changes.
- Experience with decomposition to date.

GENERAL DISCUSSION

- Organizational problems.
- Project organization.
- Communicating the results to clients, colleagues, or management.

DEVELOPMENTS TO BE EXPECTED IN THE NEAR FUTURE